

SEX-SPECIFIC CONSIDERATIONS AND EVALUATION OF TROCHLEAR DYSPLASIA IN THE TREATMENT OF PATELLOFEMORAL INSTABILITY

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Patella dislocation is a serious problem that disrupts athletic careers and influences quality of life, particularly when it is recurrent. The incidence of patellar dislocation has been shown to be most common in female adolescents. The causes of patellar dislocation are multifactorial, and the reasons for such sex-related differences are not well understood. A better understanding of risk factors such as trochlear dysplasia can help improve our treatment for this condition. While true for all athletes, attention to core stability, particularly with regard to lower limb mechanics, may be particularly important in female athletes with regard to reducing patella dislocation risk as well as ligament injury prevention, and should be explored further.

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One of the primary risk factors for patellar instability is trochlear dysplasia, which involves flattening of the femoral trochlea. Trochlea dysplasia is commonly associated with patella instability and is associated with more lateral entrance of a patella to the femoral trochlea. Female gait and stance can exacerbate this risk factor for patella dislocation. It is very helpful to understand trochlear dysplasia in 3 dimensions as it pertains to decision-making regarding dislocation risk and surgical indications for patellar instability. Currently, morphological differences between males and females have not been fully explored.

Decisions regarding patellar instability surgery in patients with trochlear dysplasia have been almost exclusively based on two-dimensional (2D) imaging. Yet trochlear dysplasia is an extremely complicated, multi-planar, dynamic problem that is difficult, if not impossible, to understand in two

dimensions. Dynamic imaging provides a more complete picture of one patient's patella tracking pattern and is therefore likely to improve quality of decision-making about how to best treat patients with patellofemoral instability associated with trochlear dysplasia, potentially bringing particular benefit to active and athletic females.^{1,2}



Figure 1. Example of 3-dimensional (3D) printed right knee with trochlear dysplasia, demonstrating lateral patellar entrance to the groove (blue line).
(Image courtesy Christopher Schneble, M.D.)

Three dimensional (3D) imaging is powerful for developing an overview of the entire patellofemoral joint. In particular, one can appreciate the more lateral patella entrance to trochleas of many patients with patella instability.² (Figure 1). Such understanding allows a more complete overview of patellofemoral structural problems in patients with patella instability and how best to address these conditions surgically in ways that assure stability while also minimizing risk to the joints and correcting aberrant load distributions that may predispose to late arthritis when not corrected by tibial tubercle transfer.³

Beitler et al. have recently described how to create 3-D models which may be particularly useful in the treatment of patients with more complex structural problems or patients with recurrent patellar instability.⁴

In over 40 years of practice, I have seen the field evolve, both from a technological standpoint in our tools used to assess the knee, as well as knowledge regarding optimal treatment of patellar instability. During this time, the role of women in sports has continued to advance. While true for all athletes, attention to core stability, particularly with regard to lower limb mechanics, may be particularly important in female athletes with regard to reducing patella dislocation risk as well as protecting against ligamentous injury.

Conflict of Interest Statement

The author reports no conflict of interest with the contents of this manuscript.

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